

REQUEST FOR PROPOSAL

January 15, 2014

CONTRACT FOR PROFESSIONAL SERVICES

**Fatigue Crack Repairs
to the I-20 Bridge over the Pearl River**

**IM-0020-01(186)/104877-301000
Hinds County**

**Issuing Office
Mississippi Department of Transportation
P. O. Box 1850
Jackson, Mississippi 39215-1850**

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PART 1:
GENERAL INFORMATION FOR CONSULTANT(s)

I. Purpose

This Request for PROPOSAL (RFP) is intended to provide interested CONSULTANT(s) with sufficient information for the preparation and submission of a PROPOSAL for consideration by the Mississippi Transportation Commission (hereinafter referred to as the **COMMISSION**). The services requested consist of the following:

The CONSULTANT will provide engineering/construction services to perform a limited inspection, repair fatigue cracks, and remove welds from fatigue prone connections on the I-20 Eastbound and Westbound bridges over Pearl River, Project No. IM-0020-01(186)/104877-301000, Hinds County. The contract will include locating fatigue cracks in the bridge's superstructure, coring crack arrester holes at ends of fatigue cracks, removing and replacing welds from fatigue prone connections, coping the ends of stiffeners and diaphragm flanges at fatigue prone connections, and maintenance of traffic (also referred to as the PROJECT).

II. Issuing Office

This RFP is issued by the Mississippi Department of Transportation (MDOT) on behalf of the **COMMISSION**. CONSULTANT(s) submitting PROPOSALS must comply with the instructions in this RFP, Legal Ad, and any addenda. The issuing office is identified below:

Scot Ehr Gott, P.E.
Mississippi Department of Transportation
P.O. Box 1850
Jackson, Mississippi 39215-1850
Or e-mail at Scot Ehr Gott, P.E.
sehgott@mdot.ms.gov

III. Intent of the COMMISSION

The intent of the **COMMISSION** is to award a contract to a CONSULTANT to provide the services specified herein.

IV. The Selection Process

Selection of a CONSULTANT will be based on the criteria established in the RFP and/or any addenda. CONSULTANT(s) **shall not** submit any cost or price information with their PROPOSALS. CONSULTANT(s) for this RFP should submit complete PROPOSALS sufficient for final selection of the most qualified firm. The MDOT will then select the most qualified firm based on the criteria. The **COMMISSION** reserves the right to select the CONSULTANT for award of a contract using one of the following methods:

- A. Final ranking of all PROPOSALS based on the initial response to this RFP or
- B. Selection of a Short List of at least two and not more than five qualified CONSULTANT(s), if available. Firms on the Short List will then be asked to make presentations to the appropriate MDOT staff. The Short-listed CONSULTANTS will be notified by a written letter. The letter will also indicate all pertinent information necessary to prepare for the presentation. If this Short-list method is used, final ranking will be made after the Selection Committee evaluates the Short-listed firms.

Once the most qualified firm is selected and awarded a contract, the MDOT will provide the contract for the selected CONSULTANT to execute based on the description of work established in this RFP and/or any addenda and costs negotiated for the services. If the selected CONSULTANT does not execute the contract or is unable to meet any contractual requirements within fifteen (15) days of receipt, then MDOT may select the next most qualified firm on the selection list until a contract has been executed.

V. Type of Contract

At the COMMISSION's option, the contract will utilize a **cost plus fixed fee, labor hour/unit cost or lump sum/firm fixed price to include a maximum "not to exceed" amount**. The contract will include all appropriate federal contract provisions in accordance with 49 CFR, Part 18, as revised. The contract will provide general terms and conditions for performance of services, as well as specific instructions for fees, billing, payment, and other related items.

Once a CONSULTANT is selected by the MDOT, costs will be negotiated at a fair and reasonable price by both parties. Direct expenses may be reimbursable but will count towards the "not to exceed" amount negotiated as part of the contract.

An example of a typical MDOT professional service contract template may be found on the website at the web link indicated below. The template will be identified as "Professional Services Contract Template."

<http://sp.gomdot.com/Consulting%20Services/Pages/Templates.aspx>

All written questions regarding this contract shall be e-mailed to the below addressees no later than **the date and time indicated in the section XXI. Procurement Schedule.**

Scot Ehrgott, P.E.
sehgott@mdot.ms.gov
and copy (Cc)
Stephen Rone
srone@mdot.ms.gov

MDOT may update this template throughout the procurement process. MDOT intends to post the final contract template for this PROJECT to the website indicated above no later than **the date indicated in**

the section XXI. Procurement Schedule. Contract terms after this date are non-negotiable; however, MDOT reserves the right to modify the contract terms at its discretion.

The **COMMISSION** intends to utilize this final contract template in order to execute a contract with the selected CONSULTANT.

NOTE: This RFP document does not and is not intended to include or address every item that will be included or addressed in the contract for professional services. The contract template should be reviewed by the interested CONSULTANT for these purposes.

VI. Rejection of PROPOSALS and/or Discontinuance of Contract Execution

The **COMMISSION** reserves the right to reject any and all PROPOSALS and/or to discontinue the execution or negotiations of a contract with any party at any time prior to final contract execution.

VII. Costs Incurred by CONSULTANT Prior to Execution of a Contract

The **COMMISSION** shall not be liable for any costs incurred by any CONSULTANT prior to the execution of contract by all parties. Furthermore, the **COMMISSION** shall not be liable for any costs incurred by the CONSULTANT prior to the effective date of the Project Director's Notice to Proceed.

VIII. Addenda to and/or Questions about the RFP

Only written requests by e-mail to the below addressees will be considered.

Scot Ehr Gott
sehgott@mdot.ms.gov
and copy (Cc)
Stephen Rone
srone@mdot.ms.gov

No requests for additional information or clarification to any other MDOT office, CONSULTANT, or employee will be considered. All responses to written questions and addenda will be in writing and will be posted to the MDOT website indicated below:

<http://mdot.ms.gov/portal/LegalAd.aspx>

CONSULTANTs shall be solely responsible for checking the website for updates. The MDOT will not be responsible for any oral exchange or any exchange of information that occurs outside the official process specified herein.

All written questions shall be e-mailed to the above addressees no later than **the date and time indicated in the section XXI. Procurement Schedule.**

MDOT intends to post written answers for this RFP to the website indicated above no later than **the date indicated in the section XXI. Procurement Schedule.**

X. CONSULTANT Submission

To be considered, **seven (7) copies and one (1) CD containing electronic PDF file(s)** of the CONSULTANT's PROPOSAL must be received by **the date and time indicated in the section XXI. Procurement Schedule**, at the office of the MDOT Consultant Services Unit, addressed to Scot Ehrgott, 10th floor, Mississippi Department of Transportation Building, 401 North West Street, Jackson, Mississippi, 39201.

PROPOSALS received after this date and time may be deemed non-responsive.

XI. PROPOSALS

To be considered, CONSULTANT(s) must submit a complete response to this RFP and any addenda, addressing those requirements provided in Part 2 of this RFP. No other distribution of PROPOSALS should be made by the CONSULTANT. The original and all required copies of the PROPOSAL should be signed by an official authorized to bind the CONSULTANT to its provisions.

XII. Economy of Preparation

PROPOSALS should be prepared simply and economically, providing a straightforward, concise description of the CONSULTANT's ability to meet the requirements of the RFP and any addenda.

XIII. Prime CONSULTANT Responsibilities

The selected CONSULTANT will be required to assume responsibility for all services offered in the PROPOSAL whether or not they are produced directly by the CONSULTANT or through subconsultant(s). Furthermore, the **COMMISSION** will consider the CONSULTANT selected to be the sole point of contact with regard to contractual matters, and the MDOT retains the right to approve or disapprove all proposed subconsultant(s). CONSULTANT(s) responding to this RFP should identify all proposed partners and subconsultant(s).

Under no condition will the selected CONSULTANT be allowed to sublet or subcontract more than 60% of the work required under the contract. It is clearly understood and agreed that specific projects or phases of the work may be sublet or subcontracted in their entirety provided that the selected CONSULTANT performs at least 40% of the overall contract with its own forces.

The selected CONSULTANT must be registered with the Mississippi Secretary of State's Office to do business in the State of Mississippi prior to contract execution. Failure to comply with this requirement within thirty (30) days of selection notification may result in failure to execute a contract with the selected CONSULTANT. MDOT may then reject the selected CONSULTANT for the duration of this process and negotiate a contract with the next most qualified CONSULTANT on the list until the contract has been executed. Additional requirements may apply as identified in Part 2 of this RFP.

XIV. Disclosure of PROPOSAL Contents

All materials submitted in response to this RFP shall become the property of the **COMMISSION** and may be returned only at the **COMMISSION**'s option. All information submitted in response to this RFP shall be subject to disclosure under the Mississippi Public Records Act and any other applicable law.

XV. Nondiscrimination Requirement

By submitting a response to this RFP, the CONSULTANT agrees that they understand that the **COMMISSION** is an equal opportunity employer. It is the policy of the **COMMISSION** to comply with all applicable portions of Title VI of the Civil Rights Act of 1964 which prohibits unlawful discrimination based on race, color, creed, sex, age, national origin, physical handicap, or disability. The proposed contract will require that the CONSULTANT and all subconsultant(s) agree to strictly adhere to this policy in all employment practices and provision of services.

In the event the CONSULTANT performs work for the **COMMISSION** that involves the selection of a site or location of a facility, the CONSULTANT shall utilize criteria or methods of selection which consider the impacts and benefits of the facility on persons without discrimination because of their race, color, religion, sex, or national origin. The criteria and methods shall be designed to include proactive measures for obtaining citizen participation from persons of all applicable races, colors, religions, sexes, and national origins.

XVI. Disadvantaged Business Enterprise (DBE) Goal

The Disadvantaged Business Enterprise (DBE) goal for this contract is **0%**. The CONSULTANT shall exercise all necessary and reasonable steps to ensure that participation is equal to or exceeds the contract goal. CONSULTANTS may visit MDOT's website, www.gomdot.com, to view a complete list of Certified DBE Firms which have been certified as such by MDOT and other Unified Certification Partners (UCPs). The DBE firm must be on the Department's list of Certified DBE Firms as listed on MDOT's website and approved by MDOT to count towards meeting the DBE goal.

XVII. Notification of Selected CONSULTANT(s)

The selected CONSULTANT(s) for both the Short List (if necessary) and the final selection will be notified of their status by the MDOT. The CONSULTANT(s) whose PROPOSALS are not selected will be notified in writing of the name of the selected CONSULTANT(s).

XVIII. Debriefing Request(s)

If a CONSULTANT opts to request a debriefing following the announcement of the selected CONSULTANT(s), the CONSULTANT shall send an e-mail to the below addressees within two (2) weeks of the distribution of the notification letter of the selected CONSULTANT(s). Any debriefings shall be limited to the merits of the individual CONSULTANT's PROPOSAL.

Scot Ehrgott, P.E.
sehrgott@mdot.ms.gov
and copy (Cc)

Stephen Rone
srone@mdot.ms.gov

XIX. Contract Administration

The CONSULTANT contract will be administered by the MDOT. All payments will be made to the contracted prime CONSULTANT(s) by the MDOT. The prime CONSULTANT will be responsible for all payments to its partners and/or subconsultant(s).

XX. Key Personnel Modifications

Key Individuals and team members are to remain for the duration of the contract, and changes cannot be made without prior MDOT approval. Modifications of Key Individuals are discouraged. MDOT will not approve requests for modification without justification. Examples of justification include death of a team member, changes in employment status, bankruptcy, inability to perform, organizational conflict of interest, or other such significant cause. In order to secure MDOT's approval prior to execution of the contract, the CONSULTANT shall e-mail the below addressees:

Scot Ehrgott, P.E.
sehrgott@mdot.ms.gov
and copy (Cc)
Stephen Rone
srone@mdot.ms.gov

The request shall include:

- A. The nature of the desired change,
- B. The reason for the desired change, and
- C. A statement of how the desired change will meet the required qualification for the position/responsibility.

XXI. Procurement Schedule

The following schedule identified below lists the projected dates for the procurement of this contract.

<u>Procurement Schedule</u> <i>(*represents approximate dates only)</i>	
Advertisement dates for legal notice	January 15 th & 22 nd , 2014
Deadline for CONSULTANT's written questions	February 5 th , 2014 at 5:00 pm
*Deadline for answering written questions	*February 12 th , 2014
*Deadline for posting the final contract template	*February 12 th , 2014
Deadline for delivery of PROPOSALS	March 5 th , 2014 at 5:00 pm
*Selection of qualified CONSULTANT	*June 2014
*Contract execution	*August 2014

Note: All times are Central Time.

The contract period may include calendar years 2014 and 2015. **MDOT reserves the right to enter into additional contracts for the work covered in this RFP.**

PART 2: INFORMATION REQUIRED/SELECTION CRITERIA

I. Format for PROPOSAL

To be considered, the PROPOSAL must respond to all requirements of this RFP, the Legal Ad, and any addenda. The recommended PROPOSAL length should not exceed twenty-five (25) pages, exclusive of appendices. All resumes, certifications/licenses, SF-330 – Part II, and other information not relevant to these requirements should be included in the appendices. The following information should be included in the recommended twenty-five (25)-page maximum: the CONSULTANT's cover letter, table of contents, organizational chart, summaries and introductions, and responses to the evaluation criteria indicated in Part 2, Section III of this RFP. Pages should be numbered, single-spaced, one-sided, eight and one-half (8.5) by eleven (11) inches with margins of at least one (1) inch on all four (4) sides. No more than five (5) pages may be eleven (11) by seventeen (17) inches, but they may count as two (2) sheets each against the recommended twenty-five (25)-page maximum. Information within the recommended twenty-five (25)-page limit of the PROPOSAL must be complete and sufficient in scope for the selection committee to evaluate the CONSULTANT. Also, all text information in the twenty-five (25)-page limit should be shown in a readable font, size twelve (12) points or larger. Headers, charts, and other graphics may be provided in a different font type and size providing they are legible. Section dividers, tabs, or similar means are recommended but are not counted as part of the recommended twenty-five (25)-page maximum.

These recommendations and other instructions indicated in this RFP will be considered when evaluating the quality of the CONSULTANT's PROPOSAL.

CONSULTANT(s) are encouraged to thoroughly address the requirements of the RFP for the highest quality response. Those PROPOSAL(s) which exceed the recommended PROPOSAL length or fail to provide any of the information in the appropriate location indicated below may adversely affect the CONSULTANT's score.

II. Requirements of the PROPOSAL

CONSULTANT(s) interested in providing these services may indicate so by furnishing MDOT with **seven (7) copies and one (1) CD containing electronic PDF file(s)** of a PROPOSAL as referenced in Part 1, Section X of this RFP. The CONSULTANT should divide its PROPOSAL into the following sections as listed below, clearly separated by tabs, section dividers, or similar means; however, resumes, certifications/licenses, SF-330 – Part II, and other information not relevant to these requirements should be included in the appendices. MDOT reserves the right to obtain references and additional information from any source listed in the PROPOSAL and any other source deemed appropriate for any of the

requirements/criteria listed in this RFP. The quality of the PROPOSAL will be considered when evaluating the CONSULTANT's PROPOSAL. The PROPOSAL should provide at a minimum the following information:

A. Cover Letter

The CONSULTANT should provide a cover letter introducing its PROPOSAL. At a minimum, the cover letter should contain the name of the prime CONSULTANT and any of its subconsultant(s) and the name of an individual who will be the single point of contact throughout the selection process. In addition, the CONSULTANT must note if they are submitting as part of a joint venture.

B. Past Experience

The CONSULTANT should provide in its PROPOSAL descriptions of similar type work for up to five (5) similar projects performed with a similar scope and magnitude which qualify the CONSULTANT (and any subconsultant) for this work. Recent projects with similar scope and magnitudes are preferred although not required. This project description should include the work related to the Project Description established in Part 3 of this RFP. The projects listed should describe work related to these services for previous projects performed by the CONSULTANT and/or their subconsultant(s) with MDOT and/or other clients. **Each related project description should include a brief scope of the project, whether the CONSULTANT served as a subconsultant or a prime for the contract, a description of the amount of the CONSULTANT's contract for the work they provided for the project, the date the project was initiated, and the actual and/or scheduled completion date.** The CONSULTANT should provide contact information for each of the projects. This information should include a project client contact name, contact title, contact phone number, and contact e-mail address.

C. Description of Staff, Organizational Chart, and Resumes

The CONSULTANT(s) should propose an appropriate quantity and quality of staff to ensure the successful completion of all work with limited MDOT support. The CONSULTANT should indicate the total number of employees of the firm and indicate that sufficient staff and resources are available and dedicated to the PROJECT.

The CONSULTANT should provide a team organizational chart that identifies all proposed personnel of the CONSULTANT and any subconsultant(s) for this contract. The team organizational chart should include each individual's name, job description (for this contract), and company of employment.

The CONSULTANT should provide resumes for any Key Individuals and employee(s) of the firm anticipated to be assigned to the PROJECT as referenced in the organizational chart. Key Individuals should include the following personnel:

Project Manager: MDOT prefers that the CONSULTANT's Project Manager be on the permanent staff of the prime CONSULTANT. The Project Manager should be licensed as a Mississippi Professional Engineer and have a minimum of ten (10) years of experience with fatigue retrofits on highway bridges. The CONSULTANT should include proof that the Project Manager is licensed as a Mississippi Professional Engineer. The Project Manager should have full authority over all field personnel and is responsible for all repairs.

Inspection Team Leader: The inspection team should be led by an NBIS certified team leader (Inspection Team Leader) who has successfully completed the NHI 130078 "Fracture Critical Inspection Techniques for Steel Bridges" course and is a registered professional engineer in the State of Mississippi. The CONSULTANT should provide proof of completion of this course along with proof that he or she is licensed as a Mississippi Professional Engineer.

Quality Control Manager: The Quality Control Manager cannot be the Project Manager or individual making repairs. The Quality Control Manager should be a licensed Mississippi Professional Engineer with a minimum of five (5) years experience in fatigue retrofits on highway bridges and is preferred to be an employee of the prime CONSULTANT. The CONSULTANT should provide proof that he or she is licensed as a Mississippi Professional Engineer. The Quality Control Manager should be primarily located on the project site.

The CONSULTANT should include a list of personnel available to arrest crack locations. These personnel should have a minimum of five (5) years of experience in fatigue retrofits on highway bridges. In addition, a list of any available personnel who may perform welds should be provided. These personnel should be AWS-certified bridge welders with AWS D1.5 prequalifications for the welding procedures to be performed. All certifications should be provided in the appendix.

Resumes for any other known personnel that would be assigned to this PROJECT may also be included but are not required. Resumes must reflect qualifications and recent experience relevant to the Project Description indicated in this RFP.

D. Work Plan

The CONSULTANT should define a sound and complete Work Plan for the PROJECT. The Work Plan should be provided in narrative form that

summarizes the methodology expected to be followed to meet the requirements listed in Part 3 (Project Description), section III (Tasks), of this RFP. The CONSULTANT should use the task descriptions in Part 3 (Project Description), section III (Tasks) of this RFP as a point of departure. At a minimum, the Work Plan should address the following:

- a. Overall Approach to the PROJECT including roles of Key Individuals to successfully implement the items of the Work Plan
- b. Inspection Plan
- c. Repair Plan
- d. Quality Control Plan
- e. Final Report
- f. Plan to Mitigate and Minimize Impact on I-20 Traffic

PROPOSERS are hereby notified of the following restrictions regarding lane closures:

- No lane closures will be permitted between the hours of 6:00 A.M. and 9:00 A.M. nor between 4:00 P.M. and 7:00 P.M. local time Monday through Friday.
- Not more than one lane of traffic on either the Eastbound lanes or Westbound lanes of I-20 will be allowed to be closed at any given time.
- No lane closures will be permitted on the following holidays or the day preceeding them: New Year's Day, Independence Day, Labor Day, Thanksgiving Day or Christmas Day. In the event that one of the above mentioned holidays falls during the weekend or on a Monday, no lane closures will be allowed during that weekend or the Friday immediately preceding that holiday. For Thanksgiving Day, lane closures will not be allowed the Wednesday proceeding through the Sunday following the Holiday.
- If any of the lane closure restrictions listed above is violated, no excuses will be accepted by the Department and the CONSULTANT will be charged a fee of \$2,500.00 for each full or partial five minute period until the roadway is back in compliance with the lane closure requirement.
- For the purposes of this PROJECT, official time shall be the announced time available at the Jackson area phone number (601)355-9311.

PROPOSERS are hereby notified that preference will be given to the use of means of conducting the work that results in little or no lane closures and minimizes the impact to I-20 traffic.

E. Location/Proximity of CONSULTANT's Office(s)

The CONSULTANT should identify the location and address of the office of the firm which will be coordinating efforts for the PROJECT. In addition, the CONSULTANT should list any other office locations where any work may take place. If subconsultant(s) will be provided, the CONSULTANT should identify their office locations where work may be provided as well.

F. Quality of PROPOSAL

The overall quality of the PROPOSAL submission will be evaluated. This will include, but will not be limited to, overall layout and readability of the submission, organization and comprehensiveness of the required content, conformance with formatting guidelines, and any other characteristics of the PROPOSAL that increase the quality of the document.

G. Part II of Standard Form (SF) 330, Architect-Engineer Qualifications

Please complete the Part II of Standard Form (SF) 330, Architect-Engineer Qualifications, which can be found at the web link below:

<http://sp.mdot.ms.gov/Consulting%20Services/Pages/Forms.aspx>

This form should be provided for each CONSULTANT's (and subconsultant's) branch office anticipated to provide services.

III. CONSULTANT Selection Criteria

All responsive PROPOSALS received from CONSULTANT(s) will be reviewed and evaluated by the Selection Committee based on the selection criteria listed below. The criteria are listed in order of their relative importance to the Selection Committee.

- A. CONSULTANT's (and any subconsultant's) past experience, performance, and qualifications on similar projects with MDOT and/or other clients,
- B. Experience, performance, and qualifications of the team's staff,
- C. Experience, performance, and qualifications of the proposed Project Manager,
- D. Description, approach, and compatibility of the Work Plan,
- E. Location/proximity of the CONSULTANT's (and any subconsultant's) office(s), and
- F. Quality of PROPOSAL.

PART 3: PROJECT DESCRIPTION

NOTE: This document does not and is not intended to include or address every item that will be included or addressed in the contract for professional services.

I. Introduction

The CONSULTANT will provide engineering/construction services to perform a limited inspection, repair fatigue cracks, and remove welds from fatigue prone connections on the I-20 Eastbound and Westbound bridges over Pearl River, Project No. IM-0020-01(186)/104877-301000, Hinds County. The contract will include locating fatigue cracks in the bridge's superstructure, coring crack arrester holes at ends of fatigue cracks, removing and replacing welds from fatigue prone connections, coping the ends of stiffeners and diaphragm flanges at fatigue prone connections, and maintenance of traffic.

It is the responsibility of the CONSULTANT to provide all necessary equipment, traffic control, engineering, and inspection to perform maintenance activities for this contract. Necessary equipment is inclusive of any vehicles, bucket trucks, scaffolding, and temporary work platforms needed to perform any work described in this PROPOSAL. It is MDOT's preference to minimize impact to traffic on I-20 and utilize temporary access platforms to be provided by the CONSULTANT.

Bridge Location and Description

The Eastbound and Westbound bridges carry I-20 and I-55 over the Pearl River in Jackson, Mississippi. The focus of the repairs is the bridge main unit, consisting of continuous welded plate girder spans of 90 feet, 130 feet, and 90 feet. The east and west approaches consist of 40-foot prestressed concrete beam simple spans (not part of scope). The overall bridge length is approximately 1,232 feet for the Eastbound bridge and 1,312 feet for the Westbound bridge (see Figure I-1). There are seven (7) lines of girders in the Westbound bridge and ten (10) lines of girders in the Eastbound bridge.

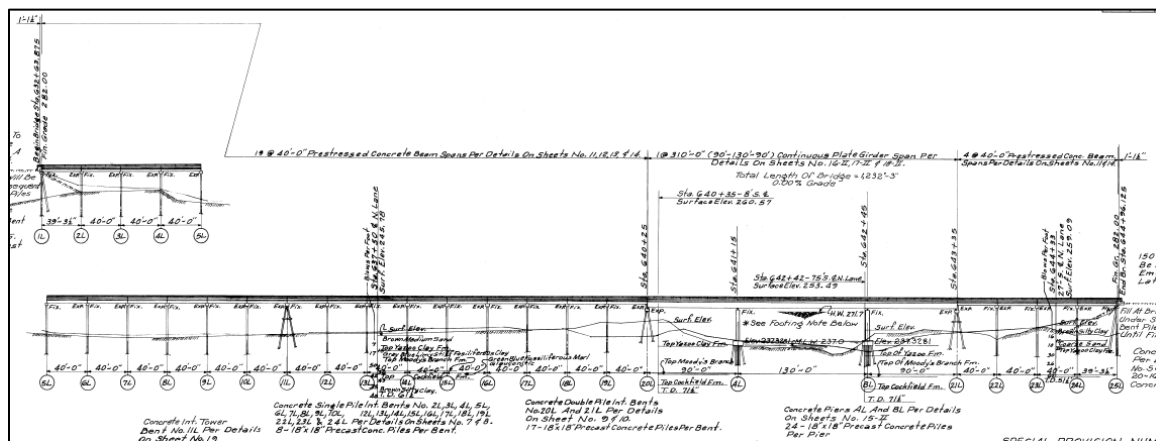


Figure I-1: General Elevation (Westbound Bridge)

Girders are identified using letters with Girder A being the northernmost girder on both bridges. Bridge element numbering increases from west to east. For the purpose of this RFP, superstructure diaphragm line 1 is at Bent 20, and diaphragm numbering increases to the east. Span 1 is the span from the end bent to Bent 2. Bent Number 2 is the bent adjacent to the end bent. The steel girder spans are Spans 20, 21, and 22. The framing plans for the Eastbound bridge and the Westbound bridge are shown in Figure I-2 and Figure I-3, respectively.

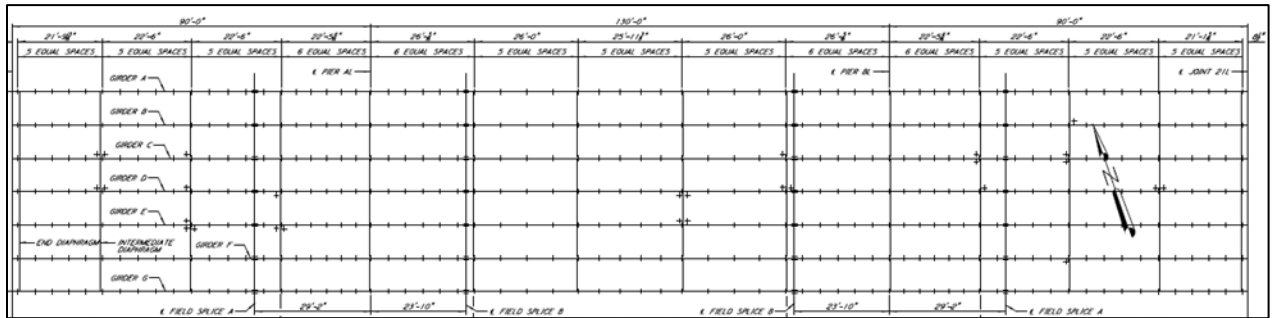


Figure I-2: Eastbound Bridge Framing Plan (Spans 20-22)

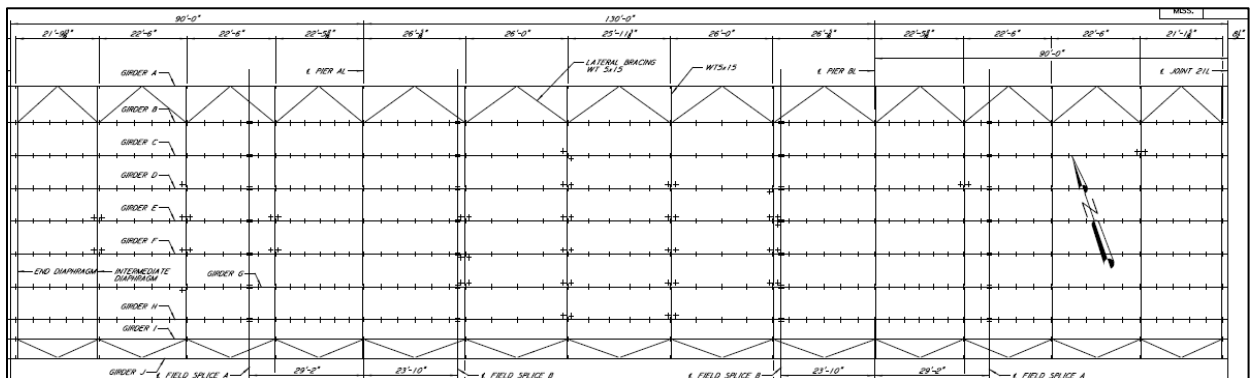


Figure I-3: Westbound Bridge Framing Plan (Spans 20-22)

History of Structure and Cracking

Both structures were completed and opened to traffic in 1965. The original continuous steel girder spans were designed with seven (7) girder lines spaced at 8 feet 4 inches²² which contained a 52-foot roadway. The original plate girders contained a 64-inch deep web and 16-inch wide flanges. The steel grade is ASTM A36. The webs are stiffened with transverse and longitudinal stiffeners. The transverse stiffeners are spaced at about four (4) feet apart. They are connected to the girder with intermittent fillet welds between the web and the stiffener. A small tack weld was used on the leading edge of the stiffener to attach to the top flange. The transverse stiffeners are clipped in the corner near the longitudinal flange to web weld of the girder with a 1-inch clip. The girder webs also have longitudinal stiffeners 13 inches above the bottom flange in the negative moment regions; the longitudinal stiffeners are discontinuous at the transverse stiffeners. Diaphragms welded to connection plates are spaced at roughly 26 feet (see Figure I-4).



Figure I-4: Typical Diaphragm

In 1992, the Eastbound bridge was widened. Substructure elements were added to the north and south of the existing substructure. One girder line was added to the north side of the existing bridge, and two girder lines were added to the south side of the existing bridge. The existing barriers were removed, and the deck was extended and new barriers placed. The new diaphragms for the widening were attached to the girder webs using continuous fillet welds on both sides of the connection plates instead of intermittent fillet welds.

II. Cracks in Main Unit

During routine inspection of the structure in 2006, cracks were noted in the webs of the girders near the diaphragm connection plates. HNTB was retained to inspect the bridge in 2008 with a follow up inspection in 2011 and 2012. During the inspection of the three welded plate girder spans for each structure, the following cracks were observed:

- In the tack weld between the connection plate and girder top flange
- In the girder web at the top of the connection plate weld
- In the girder web at the toe of the weld to the top flange directly behind the diaphragm connection plate, and
- In the vertical intermittent welds between the connection plate and the girder web.

New cracks and crack growth were noted in both structures in 2011 and 2012.

Tack Welds between Connection Plates and Girder Flanges

The tack weld between the connection plates and the girder top flange is broken and/or cracked in many locations. Cracks were isolated to the weld material and did not appear to have propagated into the girder flange (see Figures II-1 and II-2). These cracks can be

attributed to a lack of rigidity and end restraint in the connection and poor weld quality. The tack welds were not designed to resist the rotational forces induced by the combination of differential deflection of the girders and direct loading on the diaphragm.



Figure II-1: View of broken tack weld between connection plate and girder top flange (back of connection)



Figure II-2: View of broken tack weld between connection plate and girder top flange (front of connection)

Cracks in the Girder Web

The distance between the girder top flange and the start of the stiffener to web weld is approximately $\frac{3}{4}$ of an inch, which is less than the current standards. This does not provide adequate distance for the web to deflect due to the out of plane web bending.

The girder web has exhibited cracking at numerous diaphragm connection locations. Two types of cracking have been found: those in the girder web extending from the toe of the intermittent fillet welds (Figure II-3) and those in the girder web at the toe of the top flange weld (Figure II-4). These cracks can be attributed to distortion-induced fatigue stresses in the girder web caused by a lack of rigidity in the web gap region between the top flange and the first intermittent fillet weld. After cracking of the top tack weld and top intermittent weld is initiated (Figure II-5), the girder web gap region is required to resist more rotation during each loading cycle.



Figure II-3: Crack in girder web at top of connection plate intermittent weld



Figure II-4: Cracks in girder web at toe of top flange weld.



Figure II-5: Cracks in girder web at the toe of girder top flange weld and at the top intermittent weld on the connection plate

Diaphragm Strut Welded to Bottom Flanges

Several cracks were found at the diaphragm bottom strut connection to the girder bottom flange (Figures II-6 and II-7). These cracks can mainly be attributed to poor weld quality.



Figure II-6: Diaphragm bottom strut connection to girder bottom flange



Figure II-7: Fatigue prone detail, diaphragm lower brace welded to girder bottom flange

Intermittent Welds for Connection Plate to Girder Web Connection

Numerous cracks have been identified in the intermittent fillet welds attaching the vertical connection plate to the girder web (see Figure II-8). This type of cracking is caused by a lack of rigidity/end restraint in the connection. Poor weld quality has also contributed to the cracking. Inspection notes indicate cracking severity increases near the center of each span. The transverse stiffness of the bridge decreases away from the piers, causing differential deflections between girders to increase when subjected to truck traffic. Differential deflections of the girders create moments at the diaphragm connections, causing them to rotate. Additional moments are applied to this connection by local wheel loads applied to the top horizontal member of the diaphragm, as the slab sits directly on the top flange of the beam. These intermittent welds lack the strength and durability required to resist the repeatedly applied forces.



Figure II-8: Crack in weld between girder web and connection plate

Location of Cracks

Based on the 2008 and 2012 inspection, the following cracks were noted (indicated below by the type and number of occurrence respectively):

Eastbound

Broken tack weld between stiffener and girder top flange: 71

Crack in tack weld between stiffener and girder top flange: 18

Crack in girder at stiffener: 95

Westbound

Broken tack weld between stiffener and girder top flange: 61

Crack in tack weld between stiffener and girder top flange: 31

Crack in girder at stiffener: 44

For location of cracks based on the 2008 and 2012 inspection, refer to figures II-9 thru II-12.

In 2012, MDOT completed a study of six (6) locations on the Eastbound bridge. Repairs were implemented at certain locations and analyzed. For location of areas repaired/analyzed and extent of repairs completed, refer to the “I-20 Bridges over Pearl River Engineering Report” dated September 12, 2012.

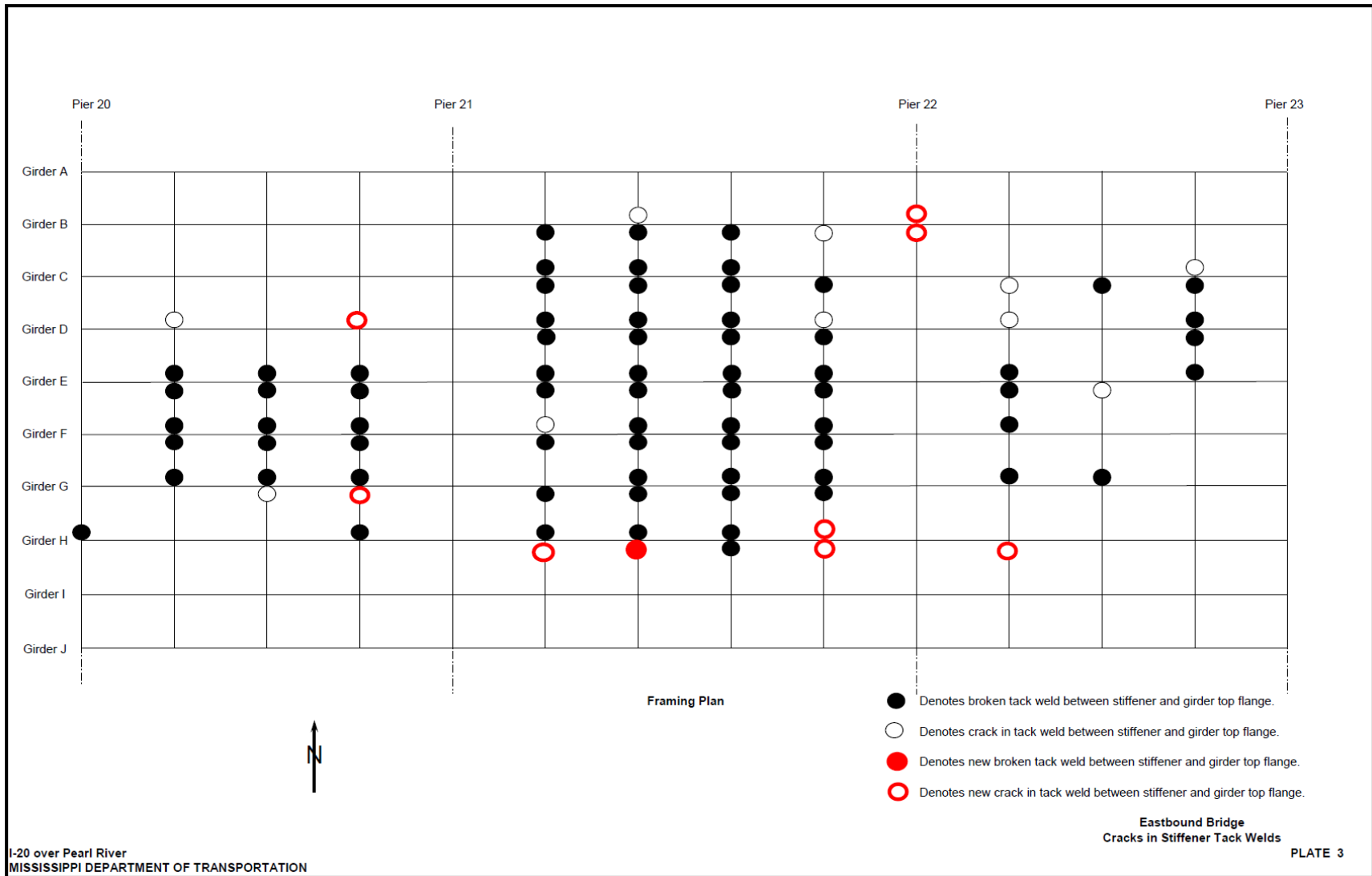


Figure II-9: Eastbound Bridge Cracks in Stiffener Tack Welds

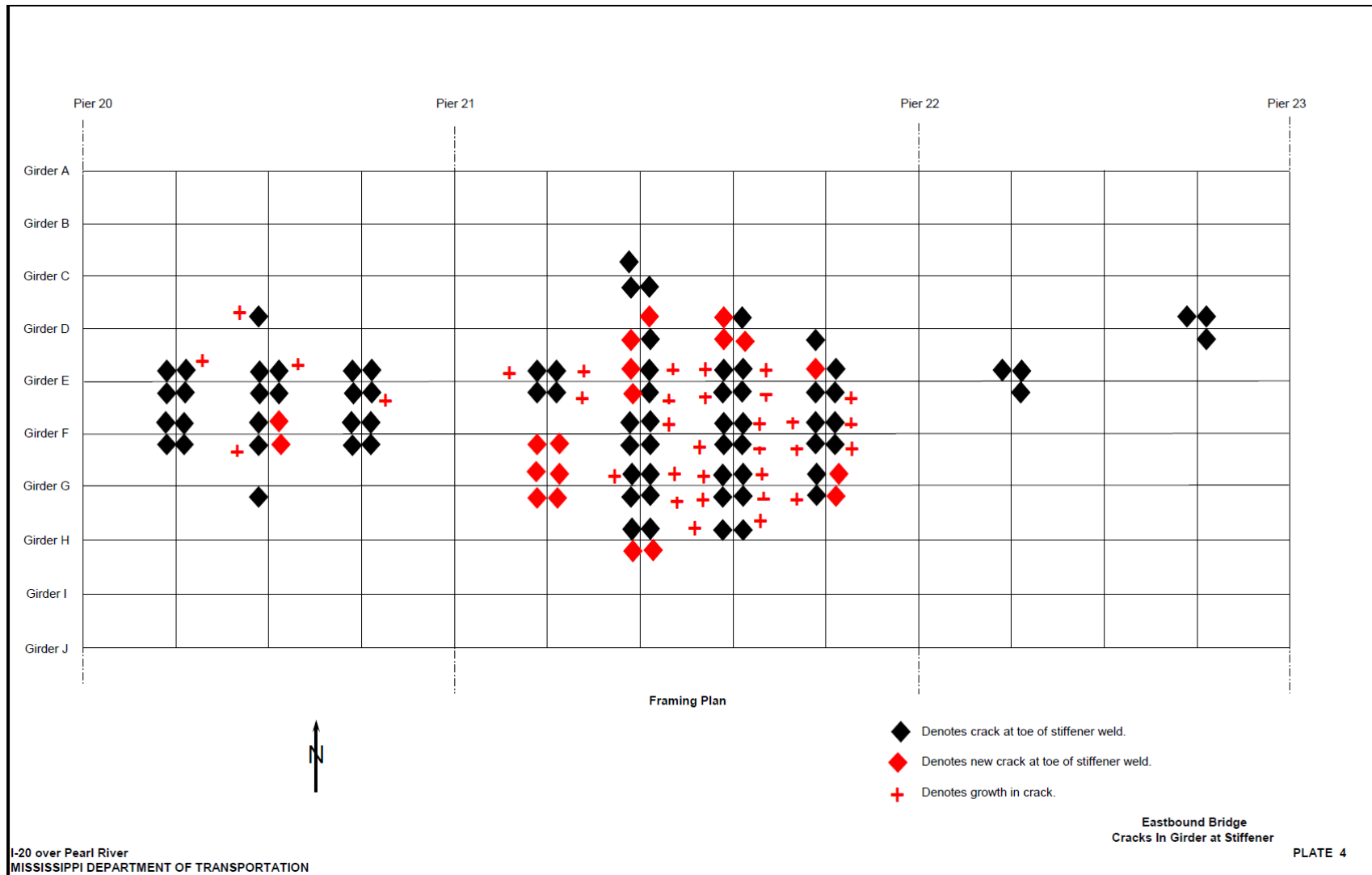


Figure II-10: Eastbound Bridge Cracks in Girders at Stiffeners

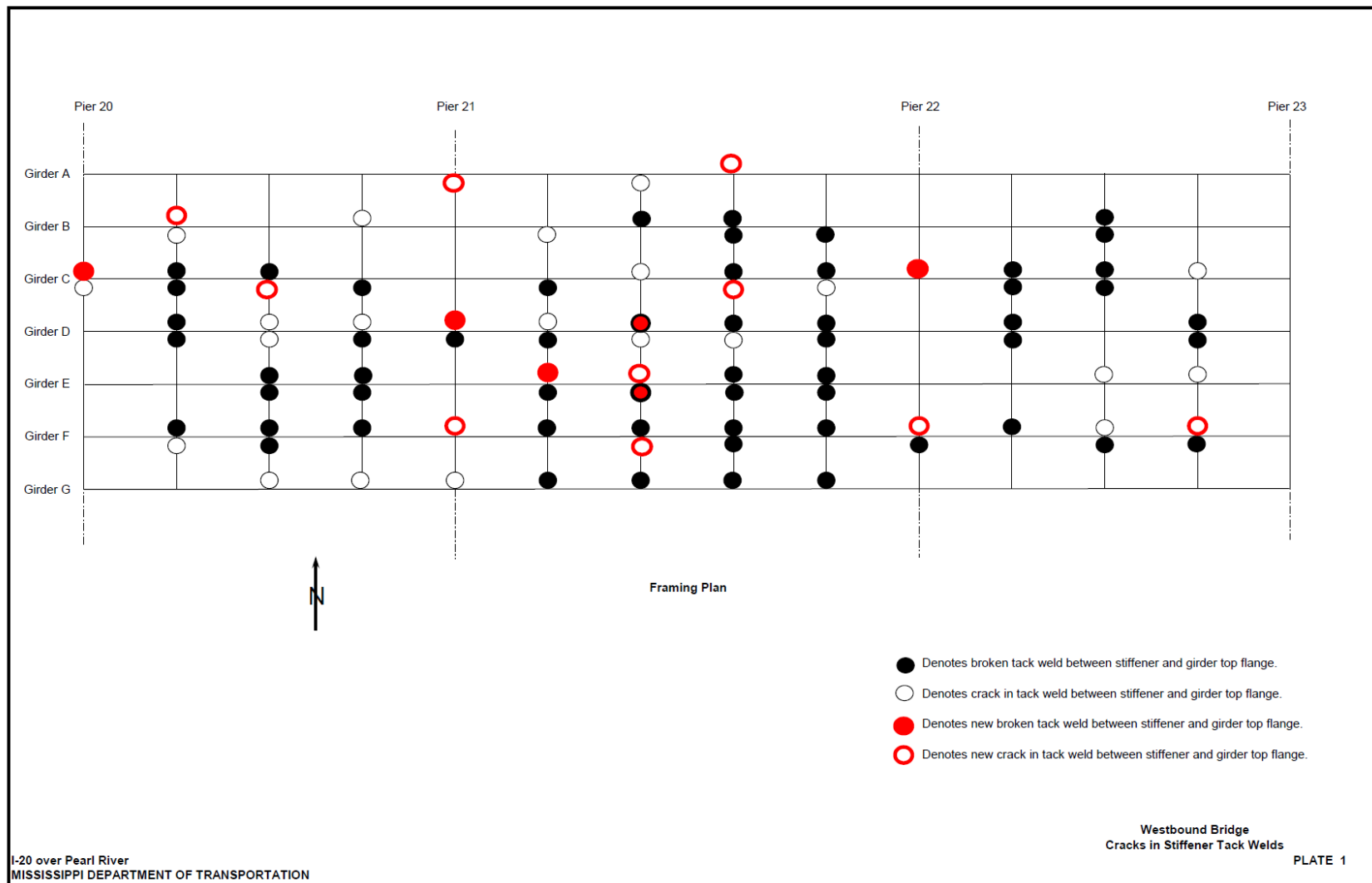


Figure II-11. Westbound Bridge Cracks in Stiffener Tack Welds

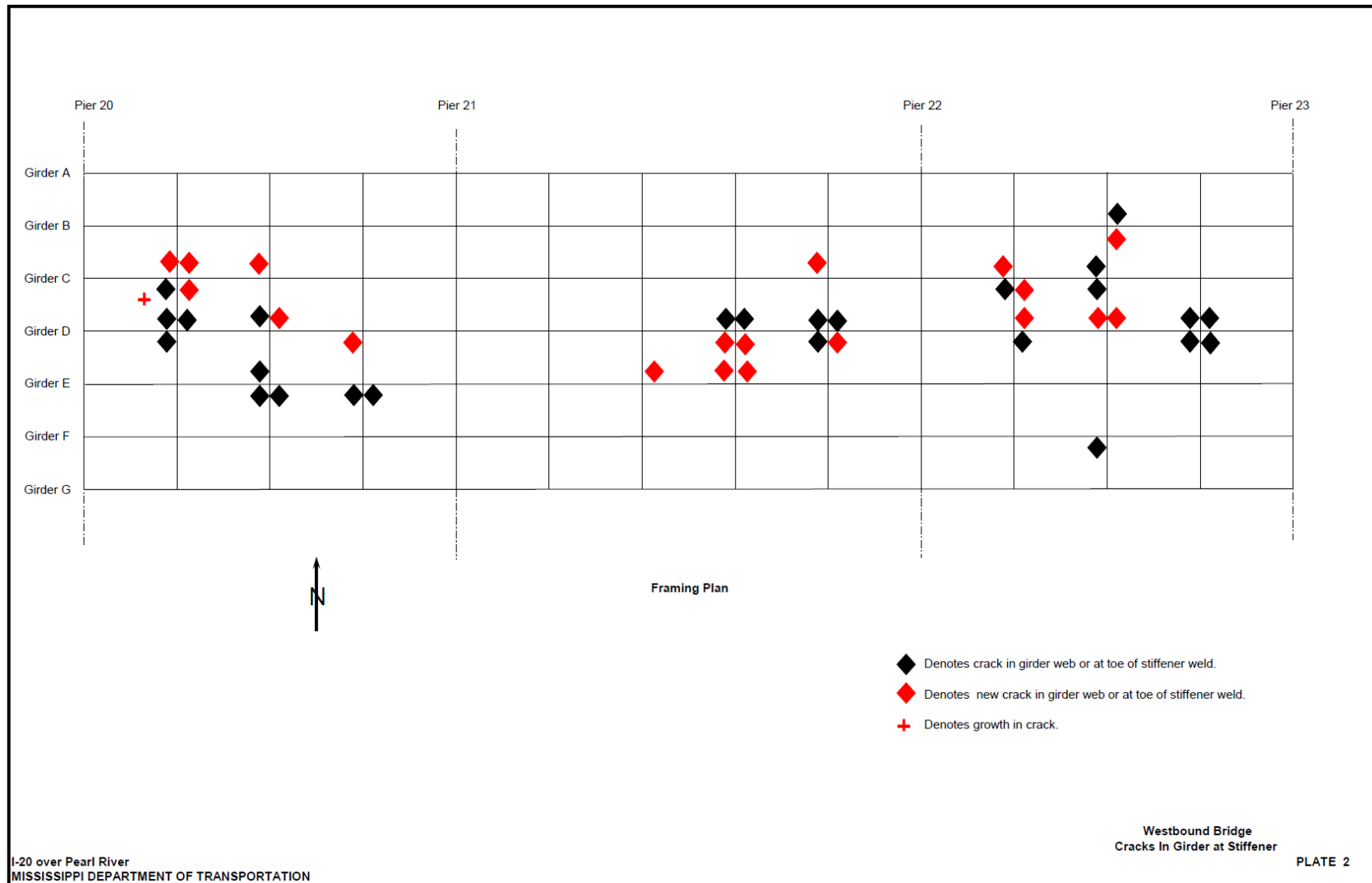


Figure II-12: Westbound Bridge Cracks in Girders at Stiffeners

III. Tasks

Task 1: Inspection

The CONSULTANT will be responsible for completing a limited in-depth inspection of the Eastbound and Westbound main units' superstructure and identifying all cracks in the steel girders.

Task 2: Report (Inspection Findings)

The CONSULTANT shall be responsible for providing MDOT a report outlining the location of all cracks. The report shall consist of a photo log of all identified cracks, crack measurements, relative location of each crack, and repair procedures for each crack.

Task 3: Repairs

The CONSULTANT shall be responsible for making all fatigue crack repairs agreed to by MDOT. No additional work shall be performed without prior written consent of MDOT.

Prior to completing any retrofits, the CONSULTANT's Project Manager will be responsible for laying out the location of all repairs (cored hole, welds, and other related repairs) in the field.

Diaphragm Connections

The selected fatigue retrofit includes welding the diaphragm connection plate to the girder top flange as well as providing a continuous fillet weld on both sides of the connection plate the full depth of the diaphragm top chord member for a total length of about 14 inches. This will require incorporating the three existing 3/16-inch intermittent welds on each side of the connection plate into one continuous 5/16-inch fillet weld. The anticipated retrofit for the diaphragm connections in positive moment regions is shown in Figure III-1.

The existing paint shall be removed using hand tool cleaning methods prior to installing the new fillet welds at the girder top flange and web unless otherwise approved by the Director of Structures, State Bridge Engineer. Depending on the extent of removal and types of contaminants in the existing paint, local containment may be required when removing existing paint. Existing intermittent welds with acceptable profiles shall have their terminations prepared in accordance with AWS procedures for continuous weld start-stops. Intermittent welds with poor profiles shall be removed using grinding techniques to expose the root pass. The girder top flange tack welds shall be ground to their root as well. Care shall be taken so that the girder web and flange plates are not notched or gouged during the operation. An AWS-certified bridge welder shall install the new fillet welds. The 5/16-inch thick connection plates are to be welded using 1/8-inch E7018 low hydrogen electrodes in accordance with AWS D1.5 prequalified welding procedures. Welding shall occur on one side of the connection plate before proceeding to the other side.

After installation of the new welds, cored-hole retrofits sized to remove the crack tips shall be installed in the girder web plate. Large diameter cores ($3\frac{1}{2}$ inches), when required, shall intersect both the top flange and connection plate fillet welds. Single crack tips can be removed using a 1-inch diameter core hole. Details of retrofits at the top of the connection plate are shown in Figures III-1 and III-2. CONSULTANT shall be responsible for repainting areas where CONSULTANT disturbed the existing coating as directed by MDOT. CONSULTANT is hereby notified the existing coating contains lead-based paint.

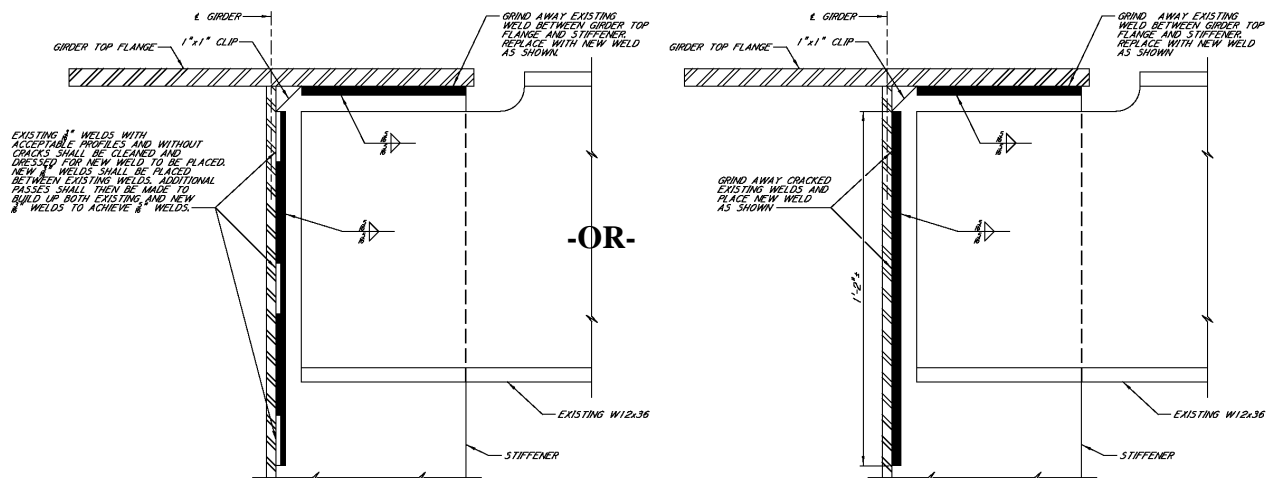


Figure III-1: Retrofit of diaphragm connection plate to girder top flange and web

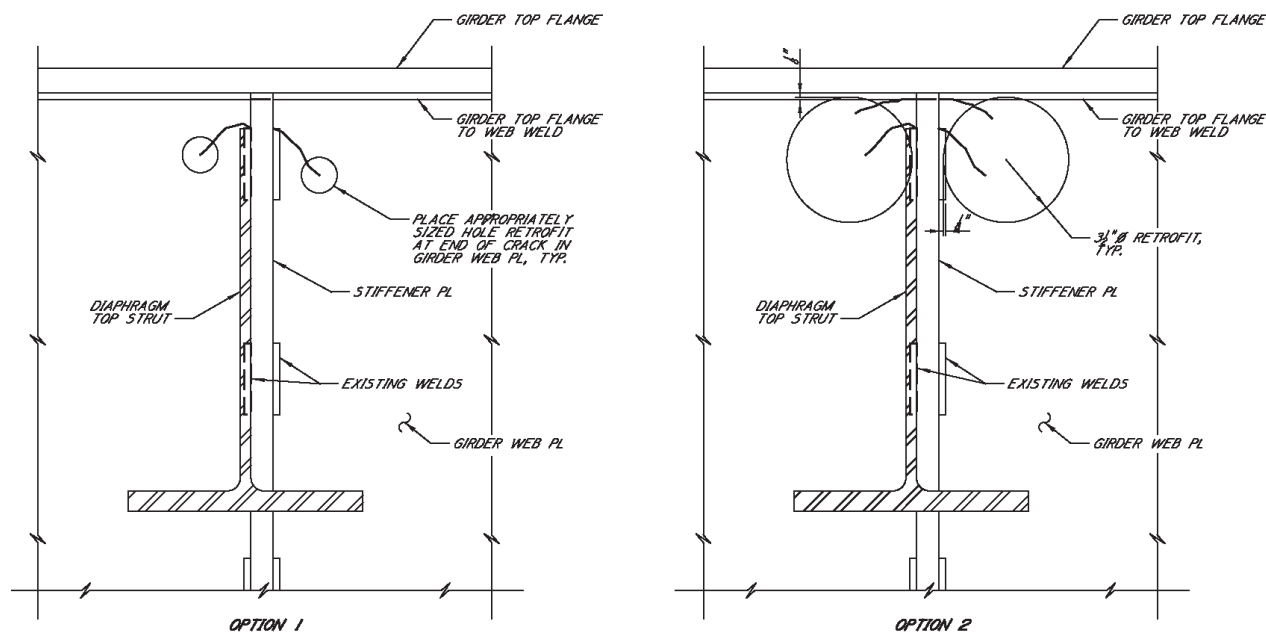


Figure III-2: Web retrofit with crack arrester holes

Longitudinal Stiffener Weld Terminations

Fatigue cracks originating from overlapping welds and small web gaps at longitudinal and transverse stiffeners have occurred in other structures. Cracks have yet to be detected in the Pearl River Bridges at locations with these same conditions. Locations of highest concern include the vertical stiffener panels at

each end of the longitudinal stiffener near the contraflexure points that can experience tension due to live loads. This is considered a Category E fatigue detail.

To address this fatigue cracking potential, a vertical cored hole through the longitudinal stiffener shall be installed that creates an opening of the web gap to a length of approximately 1½ inches between welds. Depending on the overlapping weld conditions at each connection, a hole in the vertical connection plate may also be warranted to permit the removal of the longitudinal stiffener weld remnants. This hole could be installed as either a cored or ground hole.

The implementation of these retrofits, shown in Figure III-3, serves to increase the remaining fatigue life for the load induced fatigue. The retrofit of the termination point of the longitudinal stiffener improves the AASHTO fatigue detail category from Category E to Category D. The radial transition and coping of the vertical stiffener also serves to reset the fatigue age of the stiffener termination to zero. CONSULTANT shall be responsible for repainting all exposed areas as directed by MDOT.

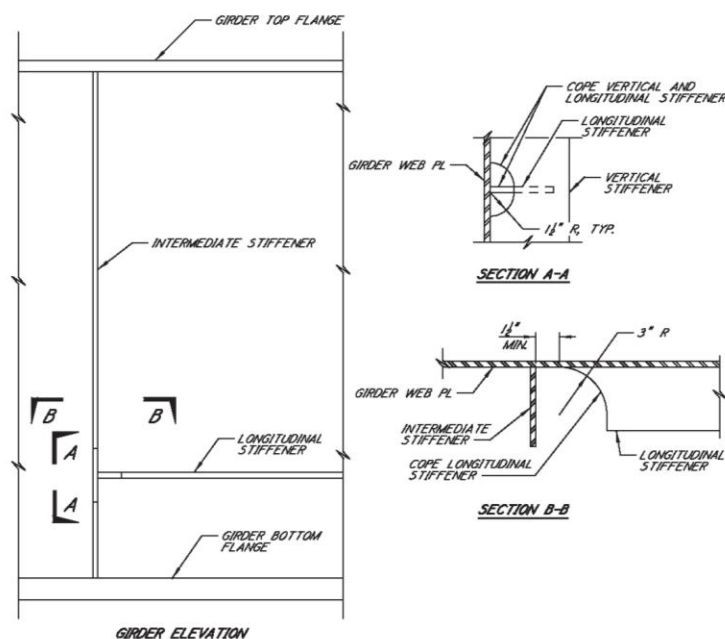


Figure III-3: Longitudinal stiffener retrofit details

Other Fatigue Sensitive Details

Throughout the structure, other welds were observed that should be addressed as part of comprehensive preventative fatigue repairs. This includes cracks at the diaphragm diagonals where they attach to the diaphragm top chord as well as locations where the bottom chord diaphragm strut was welded transversely to the girder bottom flange creating a Category E fatigue detail. Repairs would address locations where the girders experience positive bending moments that put the bottom flange in tension.

The cracked diaphragm diagonal welds should be prepared in accordance with AWS weld repair procedures and re-welded using 5/16-inch fillet welds.

To remove the fatigue sensitive conditions created at the diaphragm bottom chord to girder bottom flange weld, the coped-side flange of the diaphragm bottom chord tee section that is welded to the girder bottom flange should be cored to create a radial transition to the tee stem. After coring, the weld attaching the tee

flange to the girder flange should be removed by grinding. The opposite side welds attaching the tee flange to the girder bottom flange should also be removed using grinding methods. A detail of this retrofit is shown in Figure III-4. The vertical weld attaching the tee stem to the vertical connection plate should be inspected to determine its quality and size. Fillet welds not meeting the 3/16-inch specified design should be repaired. Care should be taken so that the girder web and flange plates are not notched or gouged during the operation.

At diaphragm locations where the welds between the diaphragm bottom strut flange and the girder bottom flange have been removed, a weld retrofit should be performed similar to the retrofit at the top of the connection plate. With the welds to the girder bottom flange removed, any forces from the diaphragm bottom strut will be transferred through the connection plate directly into the girder web. Therefore, a continuous fillet weld should be installed on both sides of the connection plate incorporating the bottom three existing 3/16-inch intermittent welds on each side of the connection plate into one continuous 5/16-inch fillet weld (See Figures III-4 and III-5). A 5/16-inch fillet weld should also be installed between the bottom of the connection plate and the girder bottom flange on the exposed side of the connection plate. CONSULTANT shall be responsible for repainting areas where CONSULTANT disturbed the existing coating as directed by MDOT.

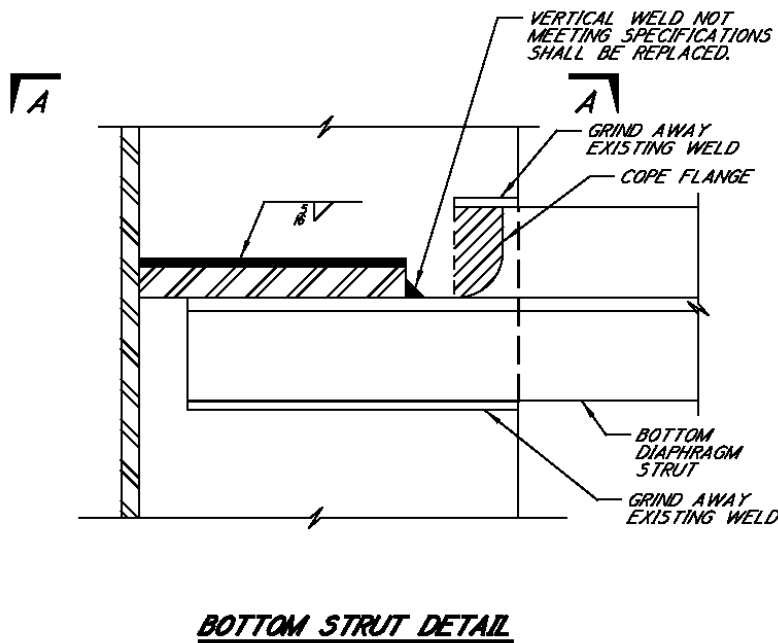


Figure III-4: Retrofit at diaphragm bottom strut connection to bottom flange

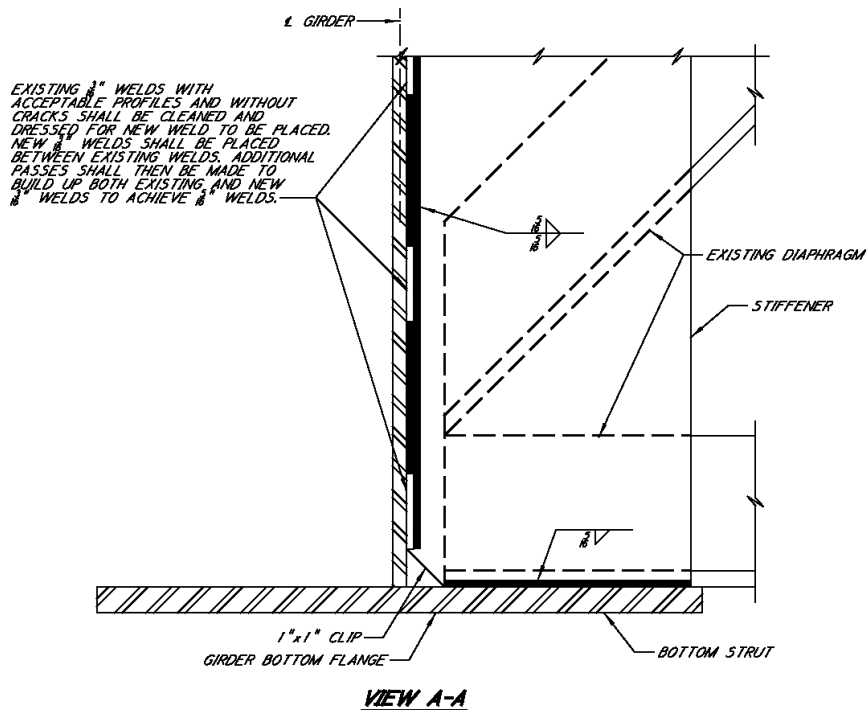


Figure III-5: Retrofit of diaphragm connection plate to bottom of web

Refer to the "I-20 Bridges over Pearl River Engineering Report" dated September 12, 2012 for detailed repair procedures and plans.

Task 4: Quality Control

CONSULTANT shall be responsible for completing nondestructive evaluation techniques including magnetic particle and dye penetrant to confirm the removal of cracks tips on both sides of the girder.

Task 5: Final Report

The CONSULTANT shall be responsible for providing a final report with a photo log of all repairs as completed. The final report shall categorically list the locations of all repairs with before and after pictures. Once all of the repairs and retrofits have been completed, a draft of the final report shall be submitted to the Director of Structures, State Bridge Engineer, for review to verify format and quality. The final report shall be sealed by the Project Manager stating all repairs have been completed under his/her direction and shall be submitted to the Director of Structures, State Bridge Engineer.